

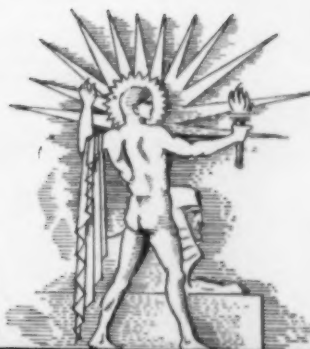
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MAR 4 - 1933

SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE •



MARCH 4, 1933

A Peaceful Fellowship

See Page 132

A

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VOL XXIII

No. 621

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Summary of Science

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DO YOU KNOW?

The famous sandalwood tree is a root parasite.

A factory opened at Voronezh will make synthetic rubber from vodka.

The Mongolian wild ass can reach a speed of 40 miles an hour, for short dashes.

Gasoline marketed in Germany must contain at least ten per cent. alcohol or a tax is levied.

Florida recently recorded 21.92 inches of rain in twelve hours, on the southeast shore of Lake Okechobee.

Some oil specialists believe that oil fields that have been abandoned as exhausted may contain 50 to 90 per cent. of their total oil.

Parks of Washington, D. C., contain 200 species of trees, some from Europe, Asia, Africa, and South America, but with the American elm predominating.

A road, built entirely by hand, between Kabul in Afghanistan and the border of Soviet Russia, is expected to expedite commercial relations between the two countries.

Milk frozen for storage has been successfully introduced in India.

Marble monuments in cities lose about one-third of an inch of their surface in a century, due to acid-laden rain.

A new brick-making machine pumps air out of the clay and so produces bricks of greater strength and density.

Glass models of famous geysers are being made, to show sightseers at the Chicago World's Fair how the great geysers pour.

A young bongo, rarest of East African antelopes, has been acquired by the New York Zoological park, and is believed to be the first of its kind in a zoo.

Dr. Walter B. Cannon, of Harvard, says: "It is not generally known that in former times smallpox was essentially a disease of children, so much so that it was called 'child pox.'"

A young farmer in western Norway recently dug up in his field the jewelry of a woman of the first century A.D.: a twisted gold bracelet, fancy silver brooch, and a large silver torque.

WITH THE SCIENCES THIS WEEK

ARCHAEOLOGY

Where was the oldest known Christian art found? p. 133.

ASTRONOMY

How far was Mars from the earth on March 3? p. 134.

ASTRONOMY-PHYSICS

What is the cosmical constant? p. 131. *The Nature of the Physical World—A. S. Eddington—Macmillan, 1929, \$3.75.*

CHEMISTRY

When did "depression flower gardens" begin? p. 135.

ENTOMOLOGY

Can flies see colors? p. 137.
Where do beetles live under water? p. 131.

EVOLUTION

In what respect were ostracoderms like hagfish? p. 138. *Organic Evolution—Richard Swann Lull—Macmillan, 1929, \$4.50.*

MARINE BIOLOGY

Where do eels come from? p. 142.
Where do different species of fish swim together? p. 132.

MATHEMATICS

What are quaternions? p. 139.

MEDICINE

Does influenza come from germs or over-heating? p. 136.

METEOROLOGY

On how many of the past ten inaugurations has it rained or snowed in Washington? p. 137.

MINING

How is iron ore made to float on oil? p. 142.

What is the world's total production of petroleum? p. 132. *Conservation of our Natural Resources—Edited by Loomis Havemeyer and others—Macmillan, 1930, \$4.*

PALEONTOLOGY

Where is the largest known plesiosaur? p. 136.

PHYSICS

What takes the place of glass in Massachusetts Institute of Technology's new high voltage tube? p. 136.

Why is a neutron unlike an onion? p. 138.

PHYSIOLOGY

When will SH stop growth? p. 140.

PSYCHOLOGY

Does a harmonious home increase a child's chances for successful psychiatric treatment? p. 133. *The Parent and the Happy Child—Lorine Pruette—Holt, 1932, \$2.*

How may primitive man have bound up wounds? p. 131.

What is the voltage of the X-ray tube that gives a radiation equal to that from all the world's radium? p. 133.

These curiosity-arousing questions will be especially valuable to the teacher. Book references in italic type are not sources of information of the article, but are references for further reading. Books cited can be supplied by Librarian, Science Service, at publishers' prices, prepaid in U. S.

ASTRONOMY-PHYSICS

Eddington Explains Link Joining Atoms and Nebulae

**"Most Elusive Constant of Nature" is Key
To Understanding in This Wedding of Great and Small**

SHADE of Sherlock Holmes! How simple his deductions seem, my dear Dr. Watson, compared with the excursions that Sir Arthur Eddington makes to the heart of the electron (if the mathematical equation sort of creature the electron turned out to be can be said to have a heart) and to the depths of the expanding universe.

Sir Arthur, one of the most audacious and fruitful of the universe makers of today, has polished off in expanded form the public lecture that he delivered at the International Astronomical Union at Cambridge, Mass., last fall. It appears in four readable chapters (if you hopscotch a bit when formulae trouble you) as "The Expanding Universe" (Macmillan).

The "hidden hand" in the drama of the universe is the cosmical constant, usually known by the small Greek letter lambda. Sir Arthur admits that his exposé of the expanding universe, his explanation of how the whole material universe of stars and galaxies of stars is dispersing, is more or less of an excuse in his trapping of the cosmical constant. Lambda is, Sir Arthur says, the "most elusive constant of nature."

Just how important the cosmical constant seems to be in the new frontiers of astronomy and physics is indicated by Sir Arthur. The galaxies, those great aggregations of stars seen as nebulae through telescopes, are phenomena on the grandest scale yet imagined. At the other end of the scale is the interior of the atom.

Ubiquitous Lambda

The connecting link is the cosmical constant. Ubiquitous lambda is the source of the scattering force, swelling the universe and driving the nebulae far and wide. In the atom, Sir Arthur finds, it has a different capacity, regulating the scale of construction of the system of satellite electrons. Sir Arthur believes that this wedding of great and small is the key to the understanding of the behavior of electrons and protons.

The cosmic constant is tied into the post-Einstein idea of the universe so tightly that Sir Arthur considers it based on a fundamental necessity of physical space, appearing in the law of gravitation that arises out of the admission that there is a radius of curvature of the universe that can be used as a comparison standard.

Impregnable

"The position of the cosmical constant seems to me impregnable," Eddington writes. "If ever the theory of relativity falls into disrepute the cosmical constant will be the last stronghold to collapse. To drop the cosmical constant would knock the bottom out of space."

The Bertillon measurements of lambda, the hidden hand? Its quantitative value expressed in fractions of centimeters to the minus second power is not very illuminating. Sir Arthur uses a whole book to explain how the cosmical detective story is being written.

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ENTOMOLOGY

Beetles Live Under Water Months Without Breathing

BEETLES with their anatomy all organized for breathing air, yet which live under water and get air to breathe only once in their lives, have been found in the cold, swift brooklets in the Great Smoky Mountains, between Tennessee and North Carolina. They belong to a rare and very little known group of insects, of which sixty species have been discovered so far in North America, report entomologists of the Smithsonian Institution, who have identified the latest captures.

The beetles hatch under water and live their larval lives submerged. After they pass through the pupal stage they come out for a little flight into the upper air, which insures their distribution. Then they get under water again and

never come to the surface any more.

In spite of their almost totally submerged lives, these beetles are not organized, as some insects are, for water breathing. They have no gills or similar apparatus, and although there is a small reservoir of air under their wing-cases, it appears doubtful whether this pocketful would suffice for normal breathing requirements for their months of life. The only suggestion that has been made is that they are naturally so inactive that their oxygen requirement is very low.

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PSYCHOLOGY

Child Invents Tools Like Those of Stone Age

EVEN IN this day of machine-made toys, children contrive tools and playthings strikingly like those made by primitive man in the Stone Age. Dr. Rosa Katz, of the psychological laboratory of the University of Rostock, Germany, found in a study of inventive genius as it appeared in her son Julius. She has reported her study to the *Journal of Genetic Psychology*.

Julius had read Robinson Crusoe, and probably got from that book the inspiration to be primitive (*Turn page*)



STONE AGE TOOLS

—find their counterparts in these playthings devised by Julius, the ingenious son of a German psychologist. To make his axe, he split the end of a stick previously made free from bark. He clamped a stone in the cleft and wound the shaft with a cord. "There is no doubt that this was the essential appearance of the first axe swung by the human hand."

and devise tools from available materials. He did not, however, get suggestions for the particular tools constructed.

While a goose was being dressed in the kitchen, Julius found that the "wind pipe" of the bird could be used as a water hose, and caused water to flow through it into a water basin. Later he blew through it and produced a hissing sound. He then stripped off the outer tissue, bored a hole through the side of the tube, and there was a primitive flute. It was possible to produce a flute from the wind-pipe only because it had first been used for water. Julius noticed this relationship.

From the same goose, Julius also made a primitive type of ornament. He noticed that the breast bone resembled somewhat a face, and immediately made of it a mask.

Among the boy's other inventions were a milling stone in which he ground the kernels of hazelnuts, a flint scraper for removing bark, a tomahawk which during peaceful times served also as a hammer, a spear, and a snail shell pendant for a feather garland. Snail-shells were used as pendants during the Stone Age.

A suggestion of how primitive man may have bound up wounds is found in another invention. Julius, while gathering some wood shavings, injured a finger. He moistened the thinnest of the shavings to bind the wound.

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MARINE BIOLOGY

Fish of Different "Feather" Often Flock Together

See Front Cover

GAME HERDS of the African veldt have long been a marvel to travelers because of the extraordinary variety of animals seen together: zebras, gnus, antelope of many species, even elephants and ostriches, mingling in a wonderful patchwork quilt of moving life. Only lions and other predators are outsiders to this Assisian fellowship.

So also it is in the gentle waters among the corals in the warmer seas. In the photograph reproduced on the cover of this issue of the SCIENCE NEWS LETTER two species of fish of the Florida coral beds are seen as peaceful companions: yellow goatfish above, yellow grunts below, like a herd of antelope with a couple of zebras as volunteer additional members. The photograph was taken by Dr. W. H. Longley of the Carnegie Institution of Washington.

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MINING

Known Oil in Ground Equals Petroleum Already Produced

Engineers Expect Oil and Gas Consumption to Continue Increase and Use of Coals to Decrease Slightly by 1950

THE PETROLEUM that engineers know lies beneath the ground ready to be extracted just about equals the total world production of oil to 1933.

The world's proven oil reserves are estimated at over 24 billion barrels, Valentin R. Garfias of New York City told the American Institute of Mining and Metallurgical Engineers. The world production to date aggregates nearly 23 billions. About 61 per cent. of the proven oil reserves are located in the American continent and close to 33 per cent. are in the Near East fields of Russia, Iraq and Persia.

"The United States with proven reserves estimated at 12 billion barrels, or 48 per cent. of the world's total, and with 65 per cent. of past production easily outranks other countries," Mr. Garfias said. "But these reserves, important as they are, when compared to the probable future consumption in the United States are far from impressive. In fact, our proven reserves will prove inadequate to meet demands for more than a few years without a pronounced falling off in demand."

"On the contrary, the very limited oil consumption in Persia, Venezuela, Rumania, Colombia, and Iraq will necessitate the marketing outside these countries of the bulk of their reserves, which aggregate 7.6 billion barrels. As a result, and although the Persian and Colombia fields are now practically under unit control, and their output may be to some extent regulated in line with demands, those in Venezuela, Iraq and Rumania will continue to be, in varying degrees, potential sources of instability in the world's oil trade."

Mr. Garfias' figures did not consider estimates of probable and possible oil reserves and covered only the world's oil that remains underground in producing fields and their logical expansions.

Oil and Gas Survey

Oil and gas will have increasing use as energy sources in the United States and by 1950 they will account for near-

ly half of the expanded fuel requirements of the nation.

A forecast of the relationship between coal and petroleum in the future and a survey of future energy requirements was presented to the Institute by Prof. W. Spencer Hutchinson of the Massachusetts Institute of Technology and August J. Breitenstein, Ashland, Pa., engineer.

In 1950 it is estimated that 499,500,000 tons of coal will be used compared with 517,018,000 tons in 1930. The situation is reversed for petroleum, with 1,419,000,000 barrel consumption predicted for 1950 and 868,484,000 barrels consumed in 1930.

Total energy per capita demanded in the United States shows a consistent growth, the engineers were told, and it increased at a faster rate than the population. Chief sources of energy today are the mineral fuels, coal and petroleum, which between them account for more than 90 per cent. of the demand, with waterpower supplying only 10 per cent.

Less Power from Coal

A marked change has occurred in the relative proportion of energy obtained from coal and oil. Only 30 years ago 91 per cent. of the country's horsepower came from coal, and only 4 per cent. from oil and natural gas, but in 1930, horsepower from coal had dropped to 60 per cent. while the proportion furnished by oil and gas had risen to 31 per (Turn to Page 140)

ASTRONOMY

Comet Not to be Seen With Unaided Eye

PELTIER'S comet, discovered by an Ohio amateur astronomer, will not become visible to the unaided eye. A parabolic orbit solution made at the University of California shows that the comet made its closest approach to the earth on Feb. 25.

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THE MARYS AT THE TOMB OF CHRIST

Yale University

This scene, with many others from the Bible, was painted on a chapel wall. Prof. Rostovtzeff has said of it: "The most interesting and chief scene of the painted decoration shows the story of the resurrection: the majestic front of the grave with two shining stars above it and the procession of the myrophores, the three Marys with their companions moving slowly and solemnly towards the grave with lighted torches and bowls full of myrrh in their hands. It is . . . painted with a gorgeous display of colors."

ARCHAEOLOGY

Oldest Known Christian Art Being Exhibited at Yale

THE EARLIEST Christian art known in the world has been brought to this country and is being exhibited to the public at Yale University, New Haven.

The paintings, showing Christ healing the sick, the Resurrection, and other Bible subjects, were discovered in Syria last year by scientists from Yale University and the French Academy of Inscriptions.

While they were excavating ruins of the old city of Dura on the Euphrates River, they unearthed a little Christian chapel of about 200 A. D. To their delighted amazement, they found its walls covered with religious frescoes. Here were Bible characters depicted just as the people thought of them within two hundred years after Christ.

Describing the finds, Prof. Rostovtzeff, Yale archaeologist, said that one of Dura's peculiar characteristics was its religious art. Dura had a mixed population, and they worshiped a variety of gods. Yet throughout the city and its temples was the same deep religious fervor expressed artistically by rich wall paintings and sculptures.

Until last year, archaeologists had found temples of Greek and Roman

gods, Arabian, Babylonian, Persian. As the city existed until 256 A.D., archaeologists expected to find some signs of Christian faith in so religious a city, but not a trace of Christianity did they observe until they struck the chapel.

"It was a small chapel in a house, perhaps that of a bishop," said Prof. Rostovtzeff. "Several such chapels of the third and fourth centuries A.D. have been discovered previously, but all were found in ruins and not one had its original decoration preserved. In fact, no church or chapel decorated with paintings or mosaics earlier than the fifth century is known to students of Christian art, except for some funerary chapels in the catacombs at Rome. Great, therefore, was the joy of the excavators when they came upon the Dura chapel still adorned with a set of wall paintings illustrating familiar episodes from the Old and New Testaments.

"These Christian frescoes now at Yale are unique. They contribute very much to our knowledge of early Christian art and iconography and show us that in the early third century A.D. Christian art was already well developed—vigorous, impressive, original."

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PSYCHOLOGY

Parents' Behavior Foretells Results of Treatment

WHEN A CHILD is brought to a child guidance clinic for treatment, the psychiatrist can tell from the behavior of the parents at the first few interviews how the treatment will result, Dr. Helen Leland Witmer, of the Smith College School of Social Work, told members of the American Orthopsychiatric Association.

If the parents are not interested in the child, perhaps resent him and wish they did not have to bother with him at all, treatment is apt to be unsuccessful, Dr. Witmer found. Failure may also be expected in cases where there is discord between the parents, with one of them lavishing on the child the affection that would normally be given the other parent.

The treatment will be successful when the child comes from a harmonious home, even if the parents have either over-indulged him or discriminated against him.

Dr. Witmer believes that from the parents' attitude toward the child in the early interviews, the psychiatrist not only can learn whether or not his treatment will succeed, but can decide to stop treatment, if it seems doomed to failure, or can try to devise new methods of treatment.

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PHYSICS

X-Ray Tube Gives Radiation Equal All Radium in World

X-RAYS as intense as all the radium in the world could produce and of a penetration and frequency equal to that of radium's gamma rays have been produced from a new porcelain insulated, grounded anode X-ray tube of new design described to the American Physical Society by Cyrus A. Poole of the Kelly-Koett Manufacturing Co., Covington, Ky. Its design is an outgrowth of the work done by Prof. C. C. Lauritsen at Pasadena, but embodies a transmission anode and is to be operated on direct current.

The new tube operates on 800,000 volts furnished by a system of cascaded electrical transformers and it is the first X-ray tube to operate on constant potential direct current at this high voltage.

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ASTRONOMY

Three Planets Decorate Evening Sky

**Mercury, on Brief Visit, Joins Mars and Jupiter;
Spring Begins at 8:43 p. m., March 20**

By JAMES STOKLEY

THE PLANETS Mars and Jupiter have now risen higher in the east. Last month they made their return to the evening sky after a period in which no planets were to be seen during the night until after midnight. They are conspicuous now in the early evening, and can be seen through the entire night. In fact, this month they are brighter than they have been for some time, because during March both bodies make their closest approach to the earth in this trip around the sun.

As you look to the east about nine o'clock you will see the sickle of Leo, the lion, high in the sky, with the bright star Regulus at the end of the handle, which points to the southeastern horizon. Just below the sickle is a bright red body. This is Mars. Directly below Mars is an even brighter object, Jupiter. Both planets shine with a steady glow that easily distinguishes them from the nearby stars, which they exceed in brilliance.

At Opposition March 1

On March 1 Mars was at opposition, that is, it was in the part of the sky directly opposite the sun, rising in the east just as the sun was setting in the west. Therefore it was visible all through the night. Shortly after this date, on the third, it was closest to the earth—only 62,717,000 miles away.

The "year" of Mars, that is, the time it takes to make a complete circuit in its orbit around the sun, is 687 days as compared with 365 for the earth. Both planets are moving around the sun in the same direction, so when Mars has returned to the same direction from the sun, the earth, with its more rapid motion, has passed this point nearly a year before. Mars keeps on going, and after 780 days the earth catches up with Mars and the two planets are again close together and in the same direction from the sun.

Were their orbits perfectly circular, the distance at such a time of opposition would always be the same. But both orbits are elliptical, and sometimes, as in 1924, Mars happens to be in op-

position when it is at the part of its orbit that comes nearest to that of the earth. Then the two bodies were only 34,500,000 miles apart. The part of the earth's orbit closest to that of Mars is the place that our planet occupies in August, and hence this close approach always occurs in that month.

At other times of opposition, the two planets are considerably farther apart. The greatest distance that can separate them when at opposition is 62,900,000 miles, so this year's is almost as bad as it can be.

Studying Mars Now

But there is another consideration, and that is that in August the sun is always far north in the sky. Because opposition means that the planet is directly opposite, Mars, at an August opposition, is towards the southern part of the sky, and, this in turn means, for astronomers in the northern hemisphere, that it does not rise very high above the horizon. Its light must penetrate a greater thickness of the earth's atmosphere and so can not be observed as well as if it were higher. At a winter opposition, on the other hand, the conditions are reversed. The sun is low and the planet is high—about 25 degrees higher than when the phenomenon occurs in August. For northern astronomers this greater altitude in the sky

compensates to some extent for the greater distance, and Mars is now being studied carefully at a number of observatories where special interest is taken in the planets.

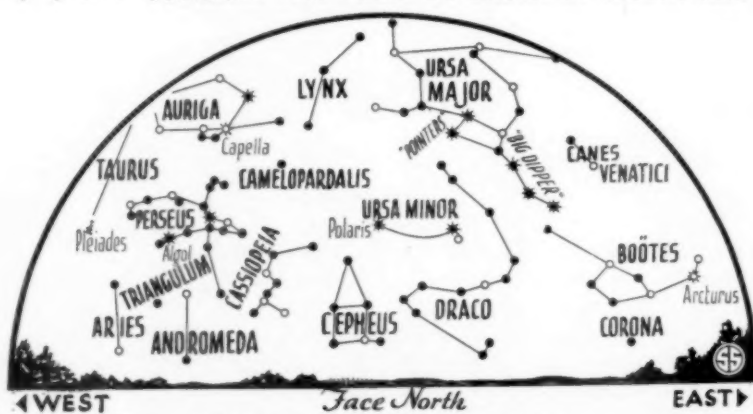
Jupiter is much farther away. It takes 11.862 years to make one of its trips around the sun, and the earth catches up to it every 399 days. Its orbit is much more nearly circular than that of Mars, so its relative distance at opposition varies much less. Its average distance at such a time is 390,000,000 miles, at best it is 367,000,000 miles, but when at opposition on the ninth of this month it will be about 412,000,000 miles away.

At this time it is of the minus two magnitude, a full unit of brightness more brilliant than Mars, which is of the minus one magnitude. This means that the more distant planet is about two and a half times as bright as the nearer one, a paradox that is explained by the greater size of Jupiter—88,000 miles in diameter as compared with 4,100 miles for Mars—which enables it to reflect a much greater amount of sunlight. These two bodies, of course, like all the planets, have no light of their own, but shine by reflected sunlight.

Shy Mercury

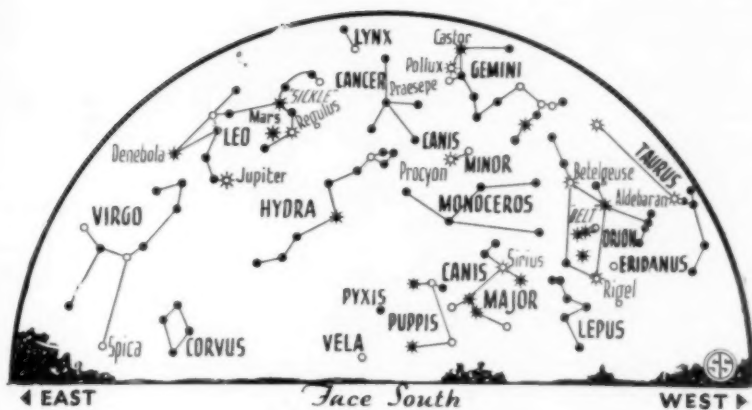
Besides these two planets which are seen all through the night and throughout the entire month, there is a third which makes a brief appearance in the western sky around the sixth. This shy little body is Mercury, innermost planet. It can never come to opposition, and is

☼ * ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



NEAREST BUT MOST DISTANT

On March 3, Mars will be 62,717,000 miles from the earth, the nearest approach of current cycle. This distance, however, happens to be practically the greatest that can separate the two planets at such a time of close approach.



READY TO VANISH

The brilliant stars Sirius, Betelgeuse, Rigel and Aldebaran are approaching the horizon behind which they will disappear until next winter.

always seen close to the sun. Sometimes it is west of the sun and appears in the eastern sky just at daybreak. At other times, as now, it is at the position called "greatest eastern elongation," and remains in the western sky a short time after the sun has set. On the sixth, Mercury will be of the minus two magnitude or as bright as Jupiter. But since it can be seen only in the twilight, it will not be nearly so easy to find.

On this date, or a day or two before or after, scrutinize the western horizon as soon as possible after the sun has descended below it. Then, perhaps you will be rewarded by seeing in the gathering dusk this planet which even the great Copernicus is said never to have viewed.

The other planet of the month is to be seen in the morning sky. Saturn rises between four and five a. m., and can be seen before sunrise, low in the southeast. Venus is not visible at all this month, because of its proximity to the sun. During the late spring and summer it will reappear as a conspicuous object in the western evening sky.

Planets in Leo

The stars of the evening sky are now assuming a vernal aspect. Orion with its two brilliant stars, Betelgeuse and Rigel, Taurus, the bull, with Aldebaran, and Sirius in Canis Major, the great dog, are in the southwest, approaching the horizon behind which they will soon vanish until next winter. Procyon, the lesser dog star, in Canis Minor, shines higher in the southwest above Sirius. Still higher and more directly west is Pollux, the more brilliant of the twins, Gemini. A little lower and more to the north is Capella, the first magnitude star in Auriga, the charioteer. In

the eastern sky, Leo, the lion, has risen high. Its position with Regulus and the sickle was referred to previously.

Mars and Jupiter are in this constellation shining brighter than any of the nearby stars. Below them is Virgo, the

CHEMISTRY

Depression Flower Gardens Are Not New Inventions

THE DEPRESSION flower gardens, that grow from chemicals and not from seeds, are not new inventions. An engineer, Tenney L. Davis, writing in *Massachusetts Institute of Technology's Technology Review*, has traced their history back to 1705 when the French chemist, Nicholas Lemery, told the French Academy how to make "vegetations" by the spontaneous evaporation of salt solutions.

Lemery used salts of iron and wrongly concluded from his experiments that iron is therefore necessary for the growth of plants. Since ammonia is used in making the 1933 model of depression garden, Tenney L. Davis remarks that it might lead to the wrong inference of a correct judgment that ammonia is essential to the growth of nearly every kind of vegetable organism.

The formula for a successful chemical flower garden is: six tablespoonfuls of salt, six tablespoonfuls of bluing, six tablespoonfuls of water and one tablespoonful of ammonia water. Mix thoroughly and pour over a clinker placed in a suitable dish. A piece of

virgin, with Spica as its most brilliant star. The brightness of Spica is somewhat diminished, however, by reason of its low altitude in the evening sky at present. A tenth first magnitude star is visible to the northeast. It is Arcturus in Bootes, the herdsman.

During March, the moon passes through its phases as follows: On the fourth it is at first quarter, on the 11th full, on the 18th at last quarter, and new on the 25th. Thus the evenings from the beginning of the month to about the 15th will be moonlit.

On the 20th the sun performs a welcome phenomenon, though at the time nothing is visible to indicate the occurrence. On that date, at 8:43 p. m. eastern standard time, the sun crosses the equator as it moves northwards in the sky. This is called the vernal equinox, as the length of night and day is then the same. Spring begins at that moment.

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coke, common brick or a mass of coal ashes can be used instead of a clinker. Not all the salt will be dissolved but pour it out with the rest. Then drop on the clinker a few drops of mercuriochrome solution, red or green ink, or other colored liquid that may be handy. But do not use iodine because it will react with the ammonia to form nitrogen iodide, which is a black powder that when dry becomes a dangerous explosive detonated by a slight shock. In a quarter of an hour the coral-like growth begins.

Another type of chemical garden is made by dropping the readily soluble salt crystals of certain metals into a jar of sodium silicate solution or "water glass." By osmosis, growths resembling marine plants spring up from the crystals and climb rapidly upward through the liquid. For brown, use ferric chloride; for grass green, nickel nitrate; for emerald green, cupric chloride; for yellow, uranium nitrate; for dark blue, cobaltous chloride or nitrate; for white, manganous nitrate or zinc sulphate.

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PHYSICS

Paper and Shellac Used In High Voltage Tube

SHELLAC and paper, instead of glass, are used to make the walls of a new type of vacuum tube that will be used with the giant high-voltage generators being developed under the auspices of the Massachusetts Institute of Technology.

Such an insulating fiber cylinder, built up out of laminated paper impregnated with a textolite shellac composition, will be placed between the two large ball electrodes of the 10,000,000 volt electrostatic generator that will soon be used to attack the atom in Col. E. H. R. Green's airship hangar at Round Hill, Mass. Within this tube the high voltages generated will play.

At Princeton University's Palmer Laboratory, Drs. L. C. Van Atta and R. J. Van de Graaff of the Massachusetts Institute of Technology and Dr. H. A. Barton of the American Institute of Physics have built an experimental fiber tube and tested it to 300,000 volts. Details have been reported in the *Physical Review*.

One novel feature is a leakage resistance that was made by drawing a line in India ink along the outside of the tube in the form of a helix.

Science News Letter, March 4, 1933

MEDICINE

Temperature Change Effect On Influenza Studied

WHEN YOU catch cold or get influenza or pneumonia is it all due to disease germs? Or do such things as being chilled, overheated or exhausted play any part? The answer to this question, now being sought at the University of California department of medicine, may lead to a means of preventing colds and kindred ailments.

"If physical or other factors can be discovered which influence the onset of respiratory diseases and which are seasonal, the way may be open to prevention," Dr. William J. Kerr, professor of medicine, explained.

Dr. Kerr and associates have built a chamber where the most variable environmental factors can be controlled. Individuals susceptible to colds are kept there under ideal conditions for comfort and without fatigue. They are then exposed to sufferers in the active stage

of colds, influenza, etc., under controlled conditions.

Attempts are being made to reproduce the common cold by natural exposure and by the use of nasal washings. Physical factors, such as changes in temperature, humidity and atmospheric pressure as well as the influence of fatigue and sudden cooling and similar factors are being studied.

The physiological principles involved in the mechanism of protecting the body against sudden changes in environment are in reality being studied. The common cold, influenza and other respiratory diseases are the ones which offer the best opportunity to study variations from normal.

Dr. Kerr emphasized the fact that the University of California studies have only just been begun and that no report on the progress can be made yet.

Science News Letter, March 4, 1933

PUBLIC HEALTH

Yellow Fever Peril In Orient Feared

AUTHORITIES in London, England, are apprehensive of an outbreak of yellow fever in the Orient. At a meeting of the Ross Institute Advisory Board, Sir Malcolm Watson and others pointed out the grave danger now existing that this disease will be spread from its focus in West Africa to East and South Africa by airplanes.

Air travel has brought various parts of the vast African continent so close together that a person might become infected in West Africa with yellow fever and reach the eastern or southern part of the continent before the three or four day period necessary for the disease to appear in him. Airplanes may also convey mosquitoes, which may spread this disease.

From East Africa it is a short jump to the Orient with its teeming millions who have never been exposed to yellow fever and consequently have probably no resistance to the disease. It would be difficult and perhaps impossible to enforce in oriental countries sanitary and quarantine regulations sufficient to check the disease before it had taken a terrific toll. For this reason, health authorities have always urged every precaution to prevent the spread of yellow fever into eastern or southern Africa.

Quarantine regulations of air travel between South America, where the disease also has a focus, and the United States have been instituted.

Science News Letter, March 4, 1933

IN SCIENCE

PALEONTOLOGY

40-Foot Plesiosaur Bones Brought From Australia

FOSSIL bones of a forty-foot plesiosaur, the largest and most complete specimen ever found in Australia, have been brought back to the Harvard Museum of Comparative Zoology by William E. Schevill, who has recently returned from an eighteen-months' expedition to that country. The bones are now being examined and prepared for permanent mounting.

During the days when dinosaurs lumbered on land, their near relatives the plesiosaurs ruled the seas. They were swimming monsters with paddles instead of legs, and powerful jaws armed with alligator-like teeth, some of them eight inches long. Their favorite prey was fish. Plesiosaurs in other parts of the world were remarkable for their extraordinarily long, snaky necks, but the Australian species had shorter, thicker necks and in general were very massively built.

Science News Letter, March 4, 1933

SEISMOLOGY

Quake Felt in Peru Centered in Bolivia

THE EARTHQUAKE that caused excitement and alarm in Peru on the morning of Thursday, Feb. 23, had its epicenter near the western boundary of Bolivia, scientists of the U. S. Coast and Geodetic Survey reported after examining seismological data telegraphically collected by Science Service from a number of American and Canadian observatories. The approximate location was given as 19 degrees south latitude, 68 degrees west longitude. Since the reports indicated a violent earthquake, destruction of property and loss of life may have occurred in case the epicenter happened to coincide with a populated region. Direct reports may not come out immediately, due to the lack of telegraph lines and other means of communication in the interior.

Science News Letter, March 4, 1933

EN FIELDS

ENTOMOLOGY

Flies Attracted to Light-Colored Clothes

FLIES go to light colors in preference to dark ones not because they have any color likes or dislikes but merely because they like to be where it is bright and warm. Indeed, in all probability they are totally color blind, and see colors only as brighter or duller degrees of gray.

These are the conclusions presented before the Optical Society of America by Zarmair Zakarian, of New York. Mr. Zakarian conducted his studies on the color choices of flies under actual working conditions as they occur in dry-cleaning establishments, because flies constitute a major problem in the cleaning and dyeing industry by their ill habit of leaving specks on delicately tinted fabrics.

In general, the experimenter said, flies prefer white, cream and other light-colored garments. They favor wet spots over dry, and satin finishes to crepe. All this indicates, he holds, that relative luminosity, rather than any specific color, governs their reactions. Further, he found, the flies seek the spots of most comfortable warmth, even leaving brighter areas to reach them.

Science News Letter, March 4, 1933

METEOROLOGY

Future Inauguration Days To Have Better Weather

WHATEVER the uncertainties of Washington weather may bring Franklin Roosevelt's inauguration as President, he can look forward with reasonable assurance to Jan. 20, 1937, for a day of settled weather. On that day, when according to the Twentieth Amendment future presidential inaugurations will take place, he can begin his second term (if the fortunes of politics so ordain) under kindlier skies than Washington usually provides around the stormy beginning of March.

An examination of Weather Bureau records for the past ten inauguration years, from Cleveland's second in 1893

to Hoover's in 1929, shows that only one of the January twentieths in that time had any measurable snow or rain. That was the first of the series, Jan. 20, 1893, which was a chilly, rainy day with a little snow. Contrasting with this, the March fourths during the same series provided rain or snow seven times out of ten chances. Cleveland's second inauguration took place in a snowstorm, and Taft rode to the White House through a veritable blizzard that dumped nearly ten inches of snow on the streets of the Capital. The most recent inauguration day, Hoover's in 1929, brought a cold, disagreeable rain that began just before the oath of office was administered and lasted all the rest of the day.

January 20 inaugurations not only promise fairer, more settled weather, if past performance can be construed as promise, but they will probably not bring severe cold. The Weather Bureau's records for Jan. 20 in all inauguration years from 1892 to 1929 show mean temperatures above the freezing mark on all but three of the days. The highest mean temperature of the series was Jan. 20, 1913 (Wilson's first inauguration), with 49 degrees. Since the principal ceremonies of the inauguration usually take place during the warmest part of the day, the mean temperature can be expected to be bettered considerably in most years.

Science News Letter, March 4, 1933

PHYSIOLOGY

Eyes Do Not Bleach During Arctic Night

BROWN EYES do not turn blue during the long nights of the polar regions.

This is asserted by the noted Arctic explorer, Dr. Vilhjalmur Stefansson, in a communication to *Science*, following the publication in another magazine of the statement that "After a prolonged absence of sunlight, men on polar expeditions find that their eyes, irrespective of previous color, have turned blue."

Dr. Stefansson, in all his long experience in the lands of long nights, could not recall having observed this phenomenon. The statement was alleged to have been inspired by an entry in the journal of Capt. Scott, British explorer who perished after having reached the South Pole. But inquiries addressed to Capt. Scott's companions and collaborators failed to bring confirmation for this claim.

Science News Letter, March 4, 1933

PSYCHOLOGY

Popularity of Technocracy Due to Sound of Word

TECHNOCRACY has taken such a remarkable hold upon the popular fancy partly because of the sound of the word and the manner in which it is pronounced, Dr. Knight Dunlap, psychologist of Johns Hopkins University, believes.

"The word calls attention to itself, because you cannot read or say it rapidly and smoothly," Dr. Dunlap explained. "When you read a smooth, musical phrase such as 'machine age' in a sentence, the sentence flows right along. But when you come to 'technocracy' with its sharp, harsh, staccato syllables, you necessarily slow up and notice the word."

"The ideas embodied in 'technocracy' are not new, but the public never paid any particular attention to them until the invention of this new attention-attracting name."

Science News Letter, March 4, 1933

ZOOLOGY

Deer Answer Breakfast Gong In Sequoia National Park

DEER at Ash Mountain Headquarters in Sequoia National Park not only recognize the breakfast bell, but are able to distinguish between it and the early rising gong.

Each morning the bachelors at Ash Mountain are rudely awakened from their slumbers by lusty wallops on the messhouse gong, operated by the cook. At this hour, according to Mr. and Mrs. Carl G. Thompson, in charge of the mess, no deer are in sight. Half an hour later, however, when the breakfast gong is sounded, the deer troop toward the messhouse just as the men do.

While the men are at breakfast, the deer peer through the windows, watching for the "handout" which they know will be forthcoming when the men leave the table. In addition to what the men give them, scraps are thrown from the kitchen.

The people at Ash Mountain think the intelligence quotient of the Sequoia deer is high, as shown by their discrimination in ignoring the rising bell but responding at once to the breakfast gong.

Science News Letter, March 4, 1933

PHYSICS

Neutron Shown as Elementary Particle, Not Combination

THE NEUTRON is not a mere close combination of electron and proton acting like a fundamental particle of nature, but it actually is an elementary particle itself.

This is the conclusion of Dr. Franz N. D. Kurie, 26-year-old research fellow in the Sloane Physics Laboratory, Yale, after experiments on atomic collisions in which neutrons take part.

When Dr. Chadwick of Cambridge, England, last year discovered the neutron, it was held that it is an electrically neutral combination of the more familiar electron and proton.

By measuring the angles at which protons are ejected from nitrogen atoms, Dr. Kurie found that the neutron does not conform to the configuration described by physicists. Two views of neutrons have been held: that it is either like a dumbbell, with a positive and negative charge separated by a small distance with their effects cancelled; or is like an onion, with a sphere of one kind of electricity surrounded by a layer of the other kind so that again the charge is cancelled.

The direction in which either of these models of the neutron would eject protons has been calculated and it has been found that the dumbbell type should eject them all perpendicularly to its own path, while the onion type would eject some straight ahead, with about ten times as many being thrown off perpendicularly.

Dr. Kurie's experiments with neutrons did not confirm either of these theories and he believes that the neutron is not built according to either of the accepted models. He concludes that the neutron is an elementary particle possessing an individuality and discrete qualities as do the electron and proton.

Dr. Kurie performed his experiments with a Wilson cloud chamber, a device which makes visible the track of a swift-moving proton somewhat as an aviator can see the wake of a boat which is itself too small to be seen.

Of the three thousand neutrons which pour throughout the chamber each second but which cannot be seen since they do not disturb the molecules of the gas within, one neutron occasionally hits a

proton, the nucleus of a nitrogen atom. This proton, carrying an electrical charge, disturbs the molecules in the chamber and leaves a track which Dr. Kurie photographed with a special camera which he perfected while obtaining his doctorate at Yale under the direction of Prof. Alois F. Kovarik. The angle at which the proton has been ejected can thus be measured since the direction in which the neutrons are moving is known.

Science News Letter, March 4, 1933

EVOLUTION

New Evolutionary Ladder Outlined for Man's Ascent

A NEW evolutionary ladder of twenty-five steps, up which the human race ascended from the lowest known type of backboned animals, is outlined by Prof. William K. Gregory of the American Museum of Natural History and Columbia University.

The first complete ladder of this kind, Prof. Gregory said, was constructed by the German zoologist Haeckel. But because certain of Haeckel's views have fallen into disfavor with the present generation of biologists, the entire scheme of descent which he originated is more or less neglected.

The "New Anthropogeny" proposed by Prof. Gregory takes advantage of data that have been discovered since Haeckel was active, and leaves out some of the steps he considered important in favor of others which now appear more in keeping with the facts. The speaker emphasized, however, that the new evolutionary ladder also is to be considered liable to revision.

The lowest step on the new anthropogenetic ladder was a "pre-fish" stage, represented by the now extinct line of ostracoderms, which were mighty in the seas from a half-billion to a third of a billion years ago. These had certain structures, especially in brain and cranial nerves, fundamentally identical with those of the younger stages of the lamprey or hagfish of today.

From this stage, the descent envisioned by Prof. Gregory proceeded through primitive shark-like and fish-

like animals, through amphibians of the Coal Age, and reptiles that followed them, to "near-mammalian" reptiles that lived in South Africa when dinosaurs roamed the earth. From such a stage the transition to the reptile-like egg-laying mammals like the duckbill and the echidna still living in Australia is not too great a leap for the scientific imagination.

The more direct ancestry of man and his simian cousins can be traced through creatures grading from opossum-like animals to the tree-shrew type, Prof. Gregory holds. The earliest primates were probably something like the modern tarsiers, but less specialized. From these the old-world monkey stem developed, which in turn gave rise to more truly anthropoid forms, of which the recently discovered Australopithecus skeleton of South Africa is a striking example.

Truly human forms of early date are exemplified in Prof. Gregory's scheme of descent by the Javanese Pithecanthropus and the Peking Man of China. True man, *Homo sapiens*, originated during the Ice Age. His brain, Prof. Gregory said, retains many unmistakable marks of derivation from an anthropoid stage, but shows progressive development of centers and areas associated with speech and verbalized thinking.

"As to the possible future of mankind," he concluded, "to judge from the history of many other new groups (not species) and in consideration of his cosmopolitan distribution, mankind should be a 'good risk' for survival for an indefinite period."

Science News Letter, March 4, 1933



The Science Service radio address next week will be on the subject

GOLD

by

Scott Turner

Director of the Bureau of Mines of the United States Department of Commerce

FRIDAY, MARCH 10

at 12:45 P. M. Eastern Standard Time

Over Stations of The Columbia Broadcasting System

MATHEMATICS

Quaternions

"A Classic of Science"

Sir William Hamilton's Synthesis of Three Dimensions of Space With One of Time into a Four Dimensional World

ELEMENTARY SKETCH OF THE NATURE OF THAT CONCEPTION OF MATHEMATICAL QUATERNIONS, WHICH IS DEVELOPED MORE IN DETAIL BY SIR W. R. HAMILTON, IN HIS RECENTLY PUBLISHED VOLUME OF LECTURES ON THAT SUBJECT. In Appendix to the life of Sir William Rowan Hamilton, by Robert Perceval Graves. 3 volumes. Dublin: Hodges, Figgis & Co.; London: Longmans, Green & Co.; 1889.

THE WORD "Quaternion" requires no explanation, since, although not now very commonly used, it occurs in the Scriptures and in Milton. Peter was delivered to "four quaternions of soldiers" to keep him; Adam, in his morning hymn, invokes air and the elements, "which in quaternion run." The word (like the Latin "quaternio," from which it is derived) means simply a set of four, whether those "four" be persons or things.

(2) But the question arises, what special connexion has the number Four with mathematics generally, or with that branch of mathematical science in particular, to which the "Lectures on Quaternions" relate?

(3) One general form of answer to this question is the following:—that in the mathematical quaternion is involved a peculiar synthesis, or combination, of the conceptions of *space* and *time*; and that while *TIME* is usually pictured or represented by metaphysicians under the figure of a *line*—a single stream with its *ONE* current—an unique axis of progression, *SPACE* is, on the contrary, imagined or conceived in connection with *THREE* distinct axes, three lines at right angles to each other;

such as the three edges of a room, which meet at a corner of the ceiling, or of the floor, one vertical and two horizontal; height, length, and breadth. In *time*, we have only the forward and the backward, looking before and after. In *space*, there is not merely the contrast between the directions of upward and downward, but also between those of southward and northward, and again between westward and eastward. Time is said to have only *one dimension*, and space to have *three dimensions*. The former is on *unidimensional*, the latter a *tridimensional progression*. The mathematical *quaternion* partakes of both these elements; in technical language it may be said to be "time plus space," or "space plus time"; and in this sense it has, or at least it involves a reference to, *four dimensions*. In an unpublished sonnet to Sir John Herschel, entitled "The Tetractys" (a Greek word equivalent to the Latin *Quaternio*), the author of the Lectures introduced the two following lines, which give, in the shortest possible form, an expression of the view which has been in the foregoing remarks unfolded more at length:—

"And how the One of Time, of Space the Three,

Might in the Chain of Symbol girdled be."

(4) Those who are entirely unacquainted with mathematical science may yet derive, from what has been above remarked, a sufficient preliminary insight into the nature of the speculations and inquiries to which the "Lectures on Quaternions" relate. A philosophical, if not a technically scientific, knowledge of the author's general aim, and of the idea which has guided him, may in this way be easily attained. But a very moderate acquaintance with the conceptions of geometry will suffice to render intelligible, from another point of view, the importance which the author attaches to the number Four in mathematics.



SIR WILLIAM ROWAN HAMILTON
—was born in Dublin, Ireland, in 1805 and died in the same city in 1865. He was an astronomer and poet in addition to being one of the great mathematicians of the world.

(5) As early as the first book of Euclid's *Elements*, an attentive student is (or may be) led to consider the *relative length*, and also the *relative direction*, of one straight line as compared with another. Thus when Euclid shows, in his very first proposition, how to construct on a given base AB an equilateral triangle ABC, he virtually teaches how, when one line AB is proposed or *given*, to draw a *new line* BC (or AC), which shall in length be *equal* to the given one, and in *direction* shall make with it an *angle of sixty degrees*, namely, the angle ABC (or BAC), which is the third part of 180 degrees, or of two right angles.

(6) In this elementary example, if the length of the given base AB be taken as the standard of length, and be on that account called *unity*, or *one*, then the length of the *side* BC (or AC) of the triangle must also be denoted by the same number, *ONE*; and these two

This popular account of the principles on which his Quaternion Calculus was founded was written by Sir William Hamilton shortly after the publication of his "Lectures on Quaternions." "It is, therefore," says his biographer, "to be accepted as a fully-matured exposition of its subject." The Calculus of Quaternions is one of the foundations of modern mathematico-physical theories of the universe.

NUMBERS, one and sixty, serve in this view to define, or to describe, the length and direction of the new or constructed line BC; at least if the latter number (sixty) be combined with the consideration of a certain *hand*, or *direction of rotation*, towards which the old line BA may be conceived to *turn*, in the plane of the triangle (or of the paper), as indicated by the *curved arrow* in the figure.

(7) The foregoing view, although not precisely the same with that adopted by Euclid himself, in his exposition of the elements of geometry, is at least consistent therewith; and has been made the basis of an important and modern method of calculation, respecting *directed lines in one plane*, which seems to have been first introduced about the commencement of the present century, by Argand in France, and for which Professor De Morgan of London has lately proposed the name of *Double Algebra* because it recognizes and employs *two numerical elements* (such as the numbers 1 and 60 in the foregoing example), as required for the joint determination of the *length and direction of a straight line*. And it is now to be shown what is the nature of the passage that has been made, by the author of the Lectures on Quaternions, from such a *double system* of algebraic geometry, to what may be called, by analogy and contrast, a *quadruple system* of calculations respecting directed lines, or a system of QUADRUPLE ALGEBRA.

(8) This passage from the one system to the other may be said to consist mainly in the consideration of the *variable plane of an angle*. If, after tracing the equilateral triangle ABC on a card, which at first rests on a horizontal table, we then lift up that card, with the figure traced thereon, and lay it on a sloping desk, the triangle in its new position takes also a *new aspect*; it faces a different *region of space*, and may be conceived to *look at*, or be looked at by, a *new point of the heavens*, which is *not now the vertical point* (or zenith), as before. This *new aspect of the figure*,

or of the *plane* (or desk) on which it is now situated, is the *new circumstance* introduced, in the transition from Double to Quadruple Algebra. And in fact it is easy to see that this new circumstance, of the *varied position of the figure*, namely, of the triangle, or simply (if we choose) of the ANGLE ABC, requires the consideration of *two new numerical elements*. For we have now *two new questions* to answer, or *two new things to determine*: namely, 1st, the *slope of the desk* (or inclination of the plane), suppose forty-five degrees, conducting to a *first new number*, 45; and 2nd, the *direction of the edge* (or, technically speaking, the line of the nodes), where that slope meets the table, and which may deviate from the line of north and south by any other number of degrees, suppose seventy, giving thus a *second new number*, in this case 70.

Science News Letter, March 4, 1933

The dark film which appears inside an aluminum pan when certain kinds of water are boiled in it is reported to have no effect on health, and can be easily removed by stewing apples or other acid fruits in the pan.

PHYSIOLOGY

Growth-Checking Substance May Control Cancer Tissue

GROWTH of tissues, stimulated by the presence of naturally occurring compounds containing the sulfur-hydrogen combination known as "sulfhydryl" and designated with the chemical symbol SH, is checked by compounds containing the same combination in a partially oxidized condition. This, in summary, is the result of research by Dr. Frederick S. Hammett of the Lankenau Hospital, Philadelphia. If sustained by further experiments, Dr. Hammett's discovery will be of immense importance both scientifically and practically.

Dr. Hammett announced his discovery that sulfhydryl-containing compounds accelerate growth at a meeting of the American Philosophical Society three years ago. At that time he also suggested that a growth-checking action might be expected of the same compounds in an oxidized or partially oxidized condition.

Following up this lead, one of his

From Page 132

colleagues, Dr. Gerrit Toennies, attempted the preparation of such a growth-checking compound. He has now obtained it in a sub-oxidized sulfur derivative of cysteine, a compound present in all cells. In a communication to *Science*, Dr. Hammett says, "Dr. Toennies' brilliant success puts in our hands a compound of inestimable practical and theoretical value, the outcome from which no one can predict."

One of the outcomes which Dr. Hammett is reluctant to predict may be a hopeful new point of attack on the perennially urgent problem of cancer.

Cancer consists essentially of an uncontrollable condition of growth in otherwise normal tissues. With a potent naturally occurring growth-controlling compound in hand, something may be done toward getting this unruly growth tendency in check. It is to be emphasized, however, that the work in its present stage cannot be regarded as the discovery of a cancer (Turn to Page 142)

Water power will account for exactly the same percentage of the total energy derived in 1950 as in 1930, namely, 8.1, although the energy applied by hydro-power will be greater than in 1930.

Whereas bituminous and anthracite coal accounted for 60.3 per cent. of the total energy derived in 1930, it will account for only 46.6 per cent. in 1950.

Petroleum and its natural products, including also natural gas and natural gas gasoline, will show a marked rise. Accounting for only 31.6 per cent. of the total energy derived in 1930, they will account for 45.3 per cent. in 1950.

Science News Letter, March 4, 1933

JOSEPH PRIESTLY

—born 200 years ago, an early American scientist (by immigration) explains why he held to the phlogiston theory

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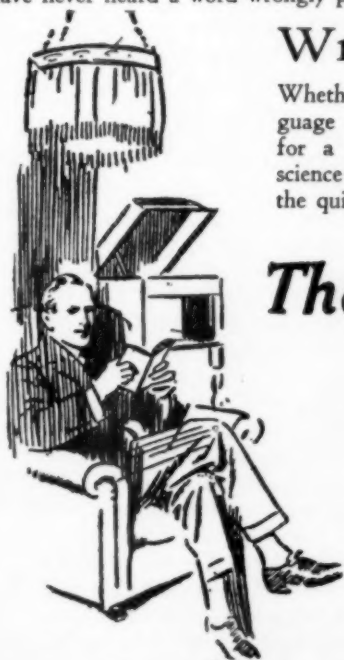
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cure, and that much more research along this special line would have to be carried out before any one could dare to try this or any similar compound on a human patient. Nevertheless, the mere existence of a compound with known definite growth-controlling powers from natural sources gives license to hope that this may eventually be one of the practical results.

Dr. Hammett and Dr. Toennies carried on their researches both in Philadelphia and at the Marine Experimental Station of the Lankenau Hospital, which is located at North Truro, Mass.

Science News Letter, March 4, 1933

MINING

Enriching Ores Foreseen To Support Steel Industry

IF THE IRON deposits of the Lake Superior region are to continue to supply the American steel industry, a few decades hence it will be necessary to concentrate or enrich the iron ore before it can be shipped profitably to the steel mills, Frank J. Tolonen of the Michigan College of Mining and Technology reported to the American Institute of Mining and Metallurgical Engineers meeting in New York.

Billions of tons of ore are available if the iron content can be increased by artificial means so as to make it cheaper to transport. Mr. Tolonen suggested various methods of ore beneficiation:

1. Seemingly most practical is the concentration of the ore into a product suitable for blast furnace reduction. This is most important because of the vast capital investment involved as well as because the blast furnace process will undoubtedly continue to be the chief method of pig iron production.

2. Direct reduction of the iron oxide

into metal, followed by magnetic separation from the gangue.

3. Production of iron directly from the ores by leaching and electrolytic precipitation.

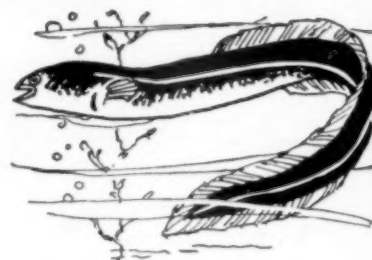
4. Production of pure iron oxide by chemical leaching and precipitation.

The use of heavy fluids as separating media in gravity concentration has shown encouraging results, Mr. Tolonen said. This method depends on the fact that a liquid will float material less than its own specific gravity, while heavier material will sink. Consequently, if a liquid can be found with a specific gravity a little greater than the gangue rock, it will float off the latter, while the iron particles will fall to the bottom without being mixed with worthless rock.

Such a liquid has been found, he continued, in acetylene tetrabromide, which has a specific gravity of 2.9, sufficient to float off the barren rock. Unfortunately the cost of such a solution is too high for use in practical ore dressing. Consequently the investigators borrowed an idea from oil drilling, and made an artificially heavy solution by introducing ore slimes into the liquid and using mechanical agitation to prevent their settling. This gave the requisite specific gravity.

Science News Letter, March 4, 1933

Discovery of new gold fields in Africa, 40 miles distant from older producing areas, was the outstanding accomplishment of geophysical prospecting during the past year in the opinion of F. W. Lee of the U. S. Bureau of Mines. Prospecting with a delicate magnetometer, the engineers located gold fields that promise to equal in size half of the present gold fields and rank in value with the famous Far East Rand.



Homer of the Eels

DR. JOHANNES SCHMIDT, Danish biologist and oceanographer who died in Copenhagen on February 22, occupied one of the most unique positions in the whole history of marine science. He was the Homer of the eels. For many years he followed the migrations of these strange but valuable fish, and solved riddles about their ways of life that had been standing for thousands of years.

Epicures in Roman days and nobles of the Middle Ages alike prized eels, but never knew where they came from. Because nobody ever saw an eel's egg or an infant eel, folk lore and superstition clustered thick about their long lithe bodies.

Johannes Schmidt set himself the task of finishing out the life history of the eels. For many years he followed their migrations, and at last traced their whole strange Odyssey. The adult eels, he found, swam from their European rivers most of the way across the Atlantic, and at last, in a deep part of the ocean north of the West Indies, laid their eggs and then died. The young eels began their return journey shortly after they were hatched, and with no guides at all found their way back to their ancestral rivers in Europe. How and why, are still mysteries.

Then Johannes Schmidt traced the migrations of eels of other continents. North American eels, he found, also migrate to deep water in the Atlantic, somewhat to the north of the breeding ground of the European eels.

Within the past few years, Dr. Schmidt's researches on the eels of southern Asia and eastern Africa traced similar routes of migration to breeding grounds in the Indian Ocean.

Science News Letter, March 4, 1933

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•First Glances at New Books

Additional Reviews
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Agriculture

WORLD AGRICULTURE: AN INTERNATIONAL SURVEY—Oxford, 295 p., \$3.50. A study group of members of the Royal Institute of International Affairs has conducted an exhaustive survey into the state of agriculture throughout the world, so far as data can be obtained. The first part of this report is mainly devoted to an examination of the causes of the fall in price of agricultural products, and the consequent distress among the farmers. Desiderata for ending the agricultural depression are considered in order, and existing mechanisms for international cooperation described. No permanent cure is seen except by a general improvement in economic conditions throughout the world.

Science News Letter, March 4, 1933

Preventive Medicine

THE CHILD AND THE TUBERCULOSIS PROBLEM—J. Arthur Myers—Thomas, 230 p., \$3. Important facts about tuberculosis are told simply and forcefully by Dr. Myers, whose idea is that the problem must be attacked through the children. Parents should be particularly interested, as they may learn in this book of many sources of tuberculous infection from which their children need protection. Teachers and school boards will also find the book helpful.

Science News Letter, March 4, 1933

Botany

PLANTS OF ROCKY MOUNTAIN NATIONAL PARK—Ruth E. Ashton—Govt. Print. Off., 157 p., 25c. Miss Ashton has made a very happy combination of popular description with scientific completeness and accuracy. Her sectional keys will be of especial value to the botanist summering in the park, while the casual visitor will be able to identify most of the plants that catch his eye by "matching them up" with the many excellent halftone illustrations. There is a bibliography of 39 titles.

Science News Letter, March 4, 1933

Physics-Engineering

HEAT TRANSMISSION—William H. McAdams—McGraw-Hill, 383 p., \$5. Sponsored by the Committee on Heat Transmission of the National Research Council, this book by the professor of chemical engineering at the Massachusetts Institute of Technology is designed to serve both as a text for students and as a reference for practicing engineers.

It contains authoritative correlations for the various important cases of heat transfer with thirty-three examples of the application of the recommended relations.

Science News Letter, March 4, 1933

Economics-Technology

AN OUTLINE OF TECHNOCRACY—Wayne W. Parrish—Farrar & Rinehart, 242 p., \$2. The author of the articles on technocracy in the New Outlook presents his conception of the principles and data of technocracy.

Science News Letter, March 4, 1933

Psychology

PERSONALITY—Marjorie Barstow Greenbie—Macmillan, 328 p., \$2.25. The author confesses that she took as her model "these books which tell you all about personality in one volume, and re-educate you in everything, from the food you eat to your last thought before going to bed," and has written in delightful style her personal observations on the art of living.

Science News Letter, March 4, 1933

Poetry

THE ARCH OF SPRING—Paul Southworth Bliss—Author, 48 p., \$1.50. The author is a nature poet of one place; he lives and writes in the country round about St. Louis, but his moods, sometimes whimsical, sometimes purely lyric, fit in all lands where spring comes and where men take joy in woods and gardens. The linoleum-block illustrations by Harold J. Matthews go excellently with the text.

Science News Letter, March 4, 1933

National Parks

EARLY HISTORY OF YELLOWSTONE NATIONAL PARK AND ITS RELATION TO NATIONAL PARK POLICIES—Louis C. Cramton—Govt. Print. Off., 148 p., 10c. This pamphlet contains all the essential source material on the discovery, early exploration, and legal creation of Yellowstone National Park, important not only *per se* but as the prototype of all other national parks of this country and of the world.

Science News Letter, March 4, 1933

Education

THE BEGINNINGS OF THE SOCIAL SCIENCES—Mary M. Reed and Lula E. Wright—Scribner's, 224 p., \$1.50. A book for teachers of the lower grades. There is an introduction by Patty Smith Hill.

Science News Letter, March 4, 1933

Public Health—Home Economics

100,000,000 GUINEA PIGS—Arthur Kallet and F. J. Schlink—Vanguard, 312 p., \$2. Two of the staff of Consumer's Research tell of the dangers they have found lurking in everyday foods, drugs and cosmetics. The book is particularly intriguing because, in addition to writing in a lively, direct style, the authors call the products they are discussing by their familiar, trade names. The book needs to be taken with a grain of salt, however. Occasionally the authors show themselves not immune from the very faults they are criticising. And while it will undoubtedly help if it awakens in you a healthy skepticism concerning the foods, drugs and cosmetics you buy, don't let it give you a phobia on any of these subjects.

Science News Letter, March 4, 1933

General Science

FOURTEENTH ANNUAL REPORT—Commonwealth Fund, 79 p. Public health and social workers will be interested to find how the activities of the Commonwealth Fund were carried on in these days of reduced budgets, as told in the annual report.

Science News Letter, March 4, 1933

Psychology

AN ELEMENTARY PSYCHOLOGY OF THE ABNORMAL—W. B. Pillsbury—McGraw-Hill, 375 p., \$3. The first edition of a new college text book by a well-known authority.

Science News Letter, March 4, 1933

Home Economics

U. S. GOVERNMENT PUBLICATIONS USEFUL TO TEACHERS OF HOME ECONOMICS—Circular No. 50, Office of Education—Department of the Interior, 11 p., free.

Science News Letter, March 4, 1933

Ethnography

ETHNOGRAPHICAL SURVEY OF THE MISKITO AND SUMU INDIANS OF HONDURAS AND NICARAGUA—Eduard Conzemius—Government Printing Office, 191 p., 10 pl., 25c.

Science News Letter, March 4, 1933

Mathematics

INTRODUCTORY COLLEGE ALGEBRA—H. L. Rietz and A. R. Crathorne—Henry Holt, 305 p., \$1.76. The second and revised edition of an algebra text on the college freshmen level.

Science News Letter, March 4, 1933

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Additional Reviews
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Mental Hygiene

MORALE, THE MENTAL HYGIENE OF UNEMPLOYMENT—George K. Pratt—*National Committee for Mental Hygiene*, 64 p., 25c., discounts on quantity orders. Dr. Pratt's splendid book should be read, not only by the social and case workers, for whom it was written, but by relatives and friends or any others who may come in contact with the unemployed. The book explains clearly and simply just what happens to the feelings and minds of these people and why their feelings make them act as they do. It also gives specific directions for how to help them handle their mental problems which are as vital as their economic ones.

Science News Letter, March 4, 1933

Physics-Meteorology

ATMOSPHERIC ELECTRICITY—B. F. J. Schonland—*E. P. Dutton*, 100 p., \$1.10. Containing chapters on the ionization of the atmosphere, penetrating radiation, electric fields and electric currents in the atmosphere and the electrification of thunderstorms, this small monograph will be of value to those who wish to review the recent technical literature in the fields covered.

Science News Letter, March 4, 1933

Agricultural Economics

THE FARM REAL ESTATE SITUATION, 1931-32—B. R. Stauber—*Govt. Print. Off.*, 51 p., 5c. This publication (U. S. D. A. Circular No. 261) gives in brief compass the gist of the grimmest problem with which this country has ever been confronted.

Science News Letter, March 4, 1933

Chemistry

EXPERIMENTAL CHEMISTRY FOR COLLEGES—J. Allen Harris and William Ure—*McGraw-Hill*, 192 p., \$1.25. A manual of experiments for first year students, as evolved in the University of British Columbia.

Science News Letter, March 4, 1933

Archaeology

THE RUINS OF HOLMUL, GUATEMALA—Raymond E. Merwin and George C. Vaillant—*Peabody Museum, Harvard Univ.*, 107 p., 36 pl., \$4.50. Dr. Merwin's excavations at this Mayan site made archaeological history. Among other achievements, he established the first ceramic stratigraphy in the Mayan field. Dr. Vaillant, who has completed the report since Dr. Mer-

win's death, writes: "It is a great tragedy that he could not have lived to complete his work and to reap the honors due him for so significant a contribution." Holmul reveals the Mayan culture springing from several local sources, and not from a single prevailing "Archaic" culture, sometimes pictured.

Science News Letter, March 4, 1933

Zoology

GORILLAS IN A NATIVE HABITAT—Harold C. Bingham—*Carnegie Inst. (Publ. 426)*, 66 p., 22 pl., paper \$2, cloth \$3. This constitutes a report of the joint expedition of 1929-30 of Yale University and the Carnegie Institution of Washington for psychobiological study of mountain gorillas in Parc National Albert, in the Belgian Congo. The investigators were able to secure much data that is entirely new and unique on the habits and behavior of gorillas.

Science News Letter, March 4, 1933

Psychology

APPROACHES TO PERSONALITY—Gardner Murphy and Friedrich Jensen—*Coward-McCann*, 427 p., \$3.75. An American psychologist and a German psychiatrist collaborate in explaining the contribution of the modern schools of psychology to the study of personality and in interpreting some of the schools of thought in the field of personality study.

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Psychology

AMERICAN SOCIAL PSYCHOLOGY—Fay Berger Karpf—*McGraw-Hill*, 461 p., \$3.50. A history of the development of this study in America and a review of its European backgrounds.

Science News Letter, March 4, 1933

Psychology-Social Work

PSYCHIATRY AND MENTAL HEALTH—John Rathbone Oliver—*Scribner*, 330 p., \$2.75. Intended for the parish priest, the social worker, and others not physicians who still must deal with mental illnesses and maladjustments.

Science News Letter, March 4, 1933

Astronomy-Physics

THE EXPANDING UNIVERSE—Sir Arthur Eddington—*Macmillan*, 182 p., \$2. See article p. 131.

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Genetics

HUMAN STERILIZATION—J. H. Landman—*Macmillan*, 341 p., \$4. A comprehensive, authoritative discussion of the subject. The legal, social, eugenic and medical aspects are fairly presented. However, Dr. Landman wisely cautions against too much enthusiasm on the subject until more scientific evidence is available.

Science News Letter, March 4, 1933

Anatomy

DISSECTION OF THE CAT—Jacob Reighard, H. S. Jennings, Rush Elliott—*Holt*, 106 p., \$1.25. This manual of anatomical dissection should be particularly helpful to student and teacher because it presents two methods of dissection: the system plan, by Reighard and Jennings; and the regional plan, favored in medical schools, by Elliott.

Science News Letter, March 4, 1933

Bacteriology

THE PHYSIOLOGY OF BACTERIA—Otto Rahn—*Blakiston*, 438 p., \$6. This book by the professor of bacteriology at Cornell University should be of great value as well as interest to bacteriologists and also, as the author hopes, to plant and animal physiologists. An interesting innovation in the make-up of the book is the combination of bibliography with the author index, the subject index being separate.

Science News Letter, March 4, 1933

Mathematics-Engineering

STRUCTURAL MECHANICS—Harrison W. Hayward, Addison F. Holmes and Ralph G. Adams—*McGraw-Hill*, 182 p., \$2.25. A carefully developed text by members of the faculty of the Massachusetts Institute of Technology which combines theories and practical example in its two parts which consider force systems and mechanics of materials.

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